

**104.10 - Light Stable Isotopic Materials (gas, liquid and solid forms)**

These RMs are for calibration of isotope-ratio mass spectrometers and associated sample preparation systems. They are distributed by NIST on behalf of the International Atomic Energy Agency (IAEA). At the request of the IAEA, quantities of these materials are limited to *one unit of each RM per laboratory every 3 years*.

The isotopic compositions are given in parts per thousand difference from isotope-ratio standards-Hydrogen and oxygen: Vienna Standard Mean Ocean Water (VSMOW), Carbon: Vienna PeeDee Belemnite (VPDB), Nitrogen: atmospheric N<sub>2</sub> (Air), Silicon: NBS28 Silica Sand (optical), and Sulfur: Vienna Canyon Diablo Troilite (VCDT). In RM 8545 (LSVEC) is also expressed as an absolute isotopic ratio.

For further information see: [SP260-149](http://SP260-149)

Technical Contact: [robert.vocke@nist.gov](mailto:robert.vocke@nist.gov)

PLEASE NOTE: The tables are presented to facilitate comparisons among a family of materials to help customers select the best SRM for their needs. For specific values and uncertainties, the certificate is the only official source.

SRM	8535	8536	8537	8538	8539	8540	8541	8542	8543	8544	8545	8546	8547	8548	8549	8550
Description	VSMOW-Water	GISP-Water	SLAP-Water Isotopic Standard	NBS30-Biotite	NBS 22-Oil	PEFI-Polyethylene Foil	USGS24-Graphite	Sucrose ANU-Sucrose	NBS18-Carbonatite	NBS19-Limestone	LSVEC-Lithium Carbonate	NBS28-Silica Sand	IAEAN1-Ammonium Sulfate	IAEAN2-Ammonium Sulfate	IAEA-NO3 Potassium Nitrate	USGS25-Ammonium Sulfate
Unit Size	(20 mL)	(20 mL)	(20 mL)	(2 g)	(1 mL)	(mg)	(0.8 g)	(1 g)	(0.4 g)	(0.4 g)	(0.4 g)	(0.4 g)	(0.4 g)	(0.4 g)	(0.4 g)	(0.5 g)
(see Certificate of Analysis for uncertainties and other details)																
$\delta^2\text{H}_{\text{VSMOW}} \times 1000$	0 <sup>a</sup> Ref [1]	-190 Ref [2]	-428 <sup>a</sup> Ref [1]	-66 Ref [2]	-118 Ref [3]	-100 Ref [2]										
$\delta^{18}\text{O}_{\text{VSMOW}} \times 1000$	0 <sup>a</sup> Ref [1]	-24.8 Ref [2]	-55.5 <sup>a</sup> Ref [1]	+5.1 Ref [6]				+7.20 Ref [15]	+28.65 Ref [15]	+3.69 Ref [15]	+9.58 Ref [2]				+25.6 Ref [8]	
$\delta^{13}\text{C}_{\text{VPDB}} \times 1000$					-30.03 Ref [5]	-32.15 Ref [5]	-16.05 Ref [5]	-10.45 Ref [5]	-5.01 Ref [5]	+1.95 <sup>a</sup> Ref [16]	-46.6 <sup>a</sup> Ref [5]					
$\delta^{18}\text{O}_{\text{VPDB}} \times 1000$									-23.01 Ref [14]	-2.2 <sup>a</sup> Ref [16]	-26.41 Ref [14]					
$\delta^7\text{Li}/7\text{Li}$											0.08215 <sup>**</sup> Ref [4]					
$\delta^{30}\text{Si}_{\text{NBS28}} \times 1000$												0 <sup>a</sup> Ref [12]				
$\delta^{15}\text{N}_{\text{Air}} \times 1000$													+0.43 <sup>a</sup> Ref [7]	+20.41 Ref [7]	+4.7 Ref [7]	-30.41 Ref [7]
$\Delta^{17}\text{O}_{\text{VSMOW}}$																-0.2 Ref [17]
$\delta^{34}\text{S}_{\text{VCDT}} \times 1000$																

<sup>a</sup> Exact values defining the delta scale  
<sup>b</sup> Interim consensus values used for scale normalization  
<sup>\*\*</sup> Absolute isotope amount ratio

References  
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2 Gonfiantini, R., Stichler, W., and Rozanski, K., 1995, IAEA-TECDOC-825, p. 13-29.  
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5 Coplen, T.B., Brand, W.A., Gehre, M., Gröning, M., Meijer, H. A. J., Toman, B., and Verkooren, R. M., 2006, Anal. Chem., v. 78, p. 2439-2444.  
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15 Calculated from data in ref 14 and relation between VPDB and VSMOW in reference 12 (page 36).  
16 Gonfiantini, R., 1984, Report to the Director General, IAEA, 77 p.  
17 Michalski, G., Savarino, J.M., Böhlke, J.K., Thiemens, M.H., 2002, Anal. Chem., Vol. 74, pp 4989-4993.



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SRM	8555	8556	8557	8558	8559	8561	8562	8563	8564	8568	8569	8573	8574
Description													L-glutamic Acid USGS41 (Heavy Carbon and Nitrogen isotopes in L-glutamic Acid)
Unit Size	NZ2-Silver Sulfide (0.5 g)	NBS123-Sphalerite (1.5 g)	NBS127-Barium Sulfate (0.5 g)	USGS32 Potassium Nitrate (0.9 g)	Natural Gas, Coal Origin (cyl)	Natural Gas, Biogenic (cyl)	CO2-Heavy, Paleomarine Origin (set (2))	CO2-Light, Petrochemical Origin (set (2))	CO2-Biogenic, Modern Biomass Origin (set (2))	USGS34 Potassium Nitrate (0.9 g)	USGS35 Sodium Nitrate (0.9 g)	L-glutamic Acid USGS40 (Light Carbon and Nitrogen isotopes in L-glutamic Acid) (1 g)	L-glutamic Acid USGS41 (Heavy Carbon and Nitrogen isotopes in L-glutamic Acid) (0.5 g)
(see Certificate of Analysis for uncertainties and other details)													
$\delta^2\text{H}_{\text{VSMOW}} \times 1000$						-138(CH <sub>4</sub> ) Ref [3]	-176(CH <sub>4</sub> ) Ref [3]						
$\delta^{18}\text{O}_{\text{VSMOW}} \times 1000$		+8.6 Ref [8]		+25.7 Ref [8]			+11.86 Ref [15]	-3.64 Ref [15]	+20.52 Ref [15]	-27.9 Ref [8]	+57.5 Ref [8]		
$\delta^{13}\text{C}_{\text{VPDB}} \times 1000$					-29.0(CH <sub>4</sub> ) Ref [3]	-72.8(CH <sub>4</sub> ) Ref [3]	-3.72 Ref [5]	-41.59 Ref [5]	-10.45 Ref [5]			-26.39 Ref [12]	+37.63 Ref [12]
$\delta^{15}\text{N}_{\text{VPDB}} \times 1000$							-18.49 Ref [14]	-33.52 Ref [14]	-10.09 Ref [14]				
$\delta^{34}\text{S}_{\text{VCDT}} \times 1000$	+22.67 Ref [12]	+17.44 Ref [13]	+21.1 Ref [12]										
$\delta^{15}\text{N}_{\text{Air}} \times 1000$				+180 Ref [7]						-1.8 Ref [8]	+2.7 Ref [8]	-4.52 Ref [1,2]	+47.57 Ref [1,2]
$\Delta^{17}\text{O}_{\text{VSMOW}}$										-0.1	+21.6 Ref [17]		

\* Exact values defining the delta scale  
 ^ Interim consensus values used for scale normalization  
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